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Intelligent Vehicle Monitoring Using Global Positioning System and Cloud Computing

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Abstract

The number of accidents is shooting upward daily along with the rising safety concerns while travelling. This research provides a solution for most of these problems with an Intelligent Vehicle Monitoring System Using Global Positioning System along with Google Maps and Cloud Computing which collects useful information about a vehicle. There are also various sensors which relay information like fuel level, driver conditions and tire pressure. The vital information like the vehicle location, speed is gathered by the GPS which is fitted in the vehicle and transmitted in near-real-time via cellular or satellite communication to a centralized server maintained in the cloud network. This information is then available for the authorized users in real time and each licensed vehicle owner can access the data in cloud using a web portal anytime anywhere. This system thus provides an accurate positioning of the vehicle, speed, driver's condition and provides an intelligent monitoring of the vehicle remotely.

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***K**eywords:* Euclidian distance, GSM, GPRS, embedded sensor,cloud computing.

1. Introduction

Vehicle tracking systems have brought GPS technology to the day-to-day life of the common man. Today GPS fitted cars; ambulances, fleets and police vehicles are common sights on the roads of developed countries. Known by many names such as Automatic Vehicle Locating System (AVLS), Vehicle Tracking and Information System (VTIS), Mobile Asset Management System (MAMS), these systems offer an effective tool for improving the operational efficiency and utilization of vehicles. GPS is used in vehicles for both tracking and navigation.

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Tracking systems enable a base station to keep track of the vehicles without the intervention of the driver where, as navigation system helps the driver to reach the destination. The all existing technology can provide only tracking the vehicle and also navigations. The proposed technology is integration of GPS systems, GSM, sensors. All mentioned systems are integrated together and transfer the data to server which is maintained in cloud infrastructures. The GPS technology integration is standard for vehicle tracking the main advantage of proposed technology is sensors based monitoring the vehicle activity.

The sensors involve:

- To identify the fuel level/status.
- Alcohol sensor – status of the driver.
- To identify current name of the location.
- To find distance covered.
- To predict arrival time.

This all stimulus data are transferred to cloud server through GSM enabled device. The GPS device used to track the vehicle locations. All the data's are stored in centralized server which is maintained in cloud. Each licenced vehicle owner can access the cloud using web portal. From the web portal the user can retrieve all the real time data. Proposed system may allow for the stability, equilibrium, efficient resource use, and sustainability of a tracking system. The GSM enabled device used to transferred the data to server. The sensors are involved to monitor the vital parameter of the vehicles and drivers. Fuel monitor sensor is used to monitor the fuel level. That is, where, when and how much fuel was filled into the tank, and also shown remaining content of the fuel in the tank. Terminal of vehicle tracking system receives data about changes of fuel level in the tank from fuel level sensor. User of vehicle tracking system knows about the unauthorized fuel draining almost immediately. All the fuel related data are transferred to cloud server. The authorized user can invoke the data and verify if any manipulation is happened or not. The authorized use can invoke the data for regular interval. If the fuel level is very low the sensor automatically produces the warning signal to driver as well as owner. Driving security of major concern in highways and the number of accidents and fatalities that occur every year there is a urgent need for a active denial system. Rather than opting for a system that will react to the inebriated status of a particular driver, we are designing a system that will be actively denying control of a moving vehicle. We achieve this using a breath alcohol sensor that will sense the fumes that form a part of the breath in a person who is under the influence of alcohol. If the device detects any up normal with driver if the driver is drunk and drive the speed of the car will be reduced and after some time car will be stopped. The all details are forward to cloud server through GSM enabled device. The authorized user can access the data real time as well as later. The authorized user can retrieve the information about current locations of the vehicle using web portal. The GPS and cloud server data can access through web portal only. The vehicle speed sensor (VSS) used to invoke the current vehicle speed and transferred the data to cloud server. The user can retrieve the details about the destinations. That is, how far from the current locations and calculates the predicted arrival time using speed of the vehicle. This information's are access through web portal. Each vehicle registered with server with identifications number.

2. Proposed System

The proposed system automatically gathered information using sensors and transmitting through GSM enabled device and GPS used to locate the current location of the vehicle. The transmitting data are stored in server which is maintained in cloud infrastructure. The client web portal used to access the server data. The authorized user can access the data. The data are stored according to the vehicle identification number. Initially the vehicle registration is carried out. Each vehicle owner have registered with own user name and password for accessing the web portal. The administrator maintained the key list of the vehicle owner information and total number of vehicle. The administrator only can add and delete the vehicle identification number from server. So it's avoid the manipulation of accessing others vehicle data. The proposed technology based on "sensors". The sensors are involved to monitor the vital parameter of the vehicles and drivers. Fuel monitor control gives user of vehicle tracking system to monitor where, when and how much fuel was filled into the tank; it avoids the manipulation of fuel and, consequently, reduces the operating costs of transport. All the information related to fuel, fuel tank capacity, when driver filled the

fuel, remaining fuel in the tank are extracted using sensors and transfer to cloud server through GSM enabled device. The GSM enabled device are direct communication with access points which is nearer to vehicles. The data are automatically updated in server. The alcohol breath sensor used to identify whether the driver is drunk or not. In case the sensor detects the alcohol, the device automatically produces the warning signal to driver and also data are transferred to cloud server. The proposed system will be heavily denying control of a moving vehicle. And also, If the device detects any up normal with driver, speed of the vehicle will be reduced and after some time car will be stopped. The all details are forward to cloud server through GSM enabled device. The authorized user can access the data real time as well as later. While a breath alcohol test can be administered a number of ways, breathalyser tests are the most common form of breath Alcohol testing and have the following characteristics: The Alcohol Sensor is a small (approx. 8cm long) handheld device which shows breath alcohol level in one of three levels, displayed on an LED display and produce warning signal. The 3 detection points are below 0.02%BAC, between 0.02%BAC and 0.05%BAC, and above 0.05%BAC (Blood Alcohol Content).

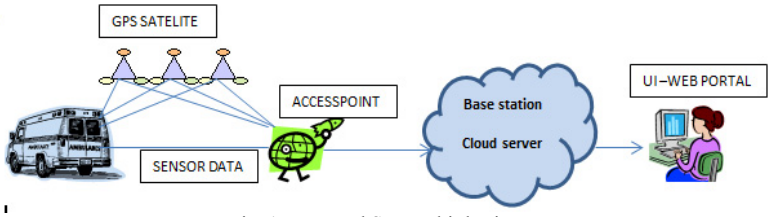

Fig. 1. Proposed System birds view

All the vehicles are equipped with GPS antenna and GSM enabled device. The GSM enabled device connected with sensors for monitoring vital parameters. The GPS antenna communicates with GPS satellite for transferring the location details. The GPS satellite transmits the signal to specific access point. The base stations servers are maintained in cloud infrastructures. The sensors are fitted with vehicle. All the sensors are interconnected together and connected with GSM enabled device. The GSM enabled device directly transfers the data to server using GSM network and access point. GSM enabled device using a robust set of techniques or protocols designed to provide fast, efficient, reliable transfer and delivery of signalling information across the GSM network and to support both switched voice and no voice applications. The server is maintained in Cloud infrastructure. Cloud computing is Internet-based computing, where by shared resources, software, and information are provided to computers and other devices on demand. The authorized user can access the cloud information via web portal. Each user have own username and password. So the manipulation of accessing others data very less and the security is very high. The user can retrieve the information real time as well as off line also. The cloud server is using Best Fit Algorithm for storing the data. The Best Fit Algorithm significantly reduces the storing space and also reduces the CO2 emission. The proposed architecture effectively utilizes the memory space.

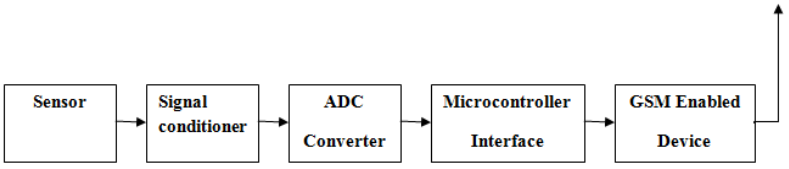

Fig.2. Sensor Interface Design

The magnetic sensors are involved to monitor the vital parameter of vehicle and driver details and transmitting to signal conditioner. A signal conditioner is a device that converts one type of electronic signal into another type of signal. Its primary use is to convert a signal that may be difficult to read by conventional instrumentation into a more easily read format. The ATMEL 89c51 is used to invoke the GSM device to transmit the data.

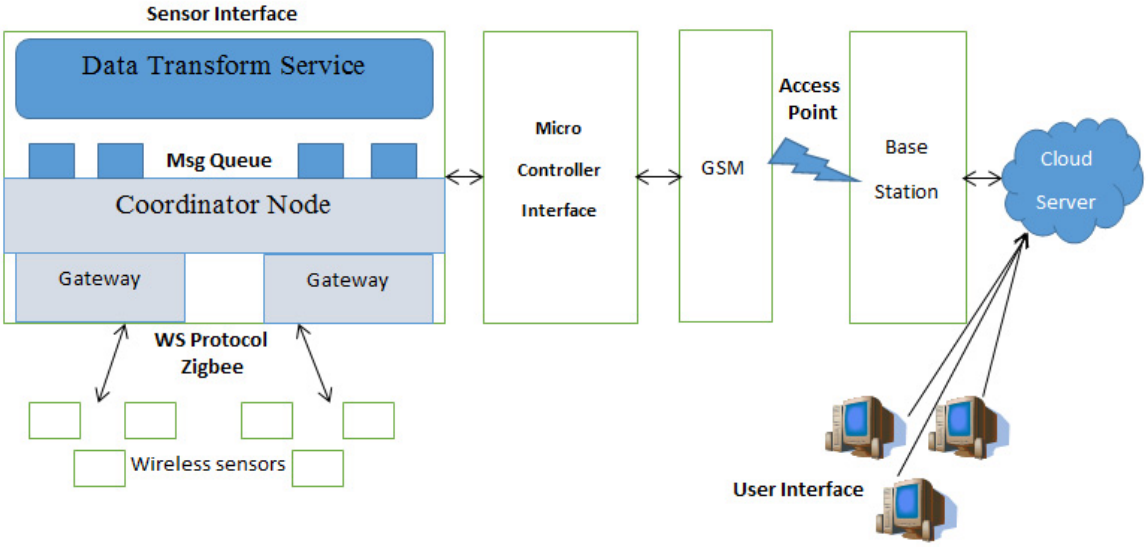

Fig. 3. Proposed Architecture Interface Design

Fig. 3. shows the proposed architecture interface design is deployed with simple components connected with cloud computing. The wireless sensor network is used to monitor the parameters. The ZigBee protocol is used to transfer the data from sensors. We use commercially available gateway IN WSN 9791 for integrating sensors. The coordinator node is used to collect all the data from sensors through gateway and maintains queue list. The queue list despatch the data according to the priority. The proposed technology uses priority scheduling algorithm for dispatching the data from queue. The functionality of the components described below: Sensors are used to collect the vital parameter of the vehicle. Sensors are used to extracting the information from fuel tank, driver conditions, speed of the vehicle and predicted arrival time. There is a specialized sensor fitted with both receiver and transmitter for transmitting the data. The data's are transmitted using ZigBee IEEE 802.15.4[4]. Coordinator node is used to integrate all the sensors and collect the patient's data. The coordinator maintains the queue for storing the data. The queue uses priority scheduling algorithm for dispatching the data to centralized server. Centralized server is responsible for collecting all the data from sensors. The sensors interface connects the sensor module and centralized server. ARM9 processor is used for developing the interface device. The GSM enabled device used to transmitting the data to base station through GSM network. The data are stored in cloud server. GSM enabled device used for Peer to peer communication between two devices for exchanging register data and also send / receive SMS messages. Cloud computing is becoming a buzzword. It refers to a computing system in which tasks are assigned through a combination of connections, service and software over a network. Cloud provides the logical and physical infrastructure to store the data. Only the authorized person can access the data from cloud environments. One of the advantages of cloud computing is that both small and medium sized business can instantly obtain the benefits of the enormous infrastructure without having to implement and administer it directly. This also permits accessibility to multiple data centre anywhere on the globe. It also means that as the need for resources increases, companies can add additional service as and when needed from the cloud computing vendor without having to pay for additional hardware. The Best Fit Algorithm is used to manage the memory space very efficiently. Best Fit Algorithm automatically stored the data according to the receiving data. The user machines are installed with web browser and also connected with internet. The authorized users enter the username and password in web portal. The web browser retrieves the particular user database. The web browser is responsible for display the information about the vehicle.

3. Circuit Model and Operation

The Vehicle moving scheme stands of GPS unit, with sensor and Micro controller. The GPS part accepts the in sequence from the embedded sensor satellites and creates a 32kbps data cord. This data cord is given to the Micro sensor which takes steps as a crossing point between the GPS unit and the visual basics. It then sends this trained data cord to the sensor.

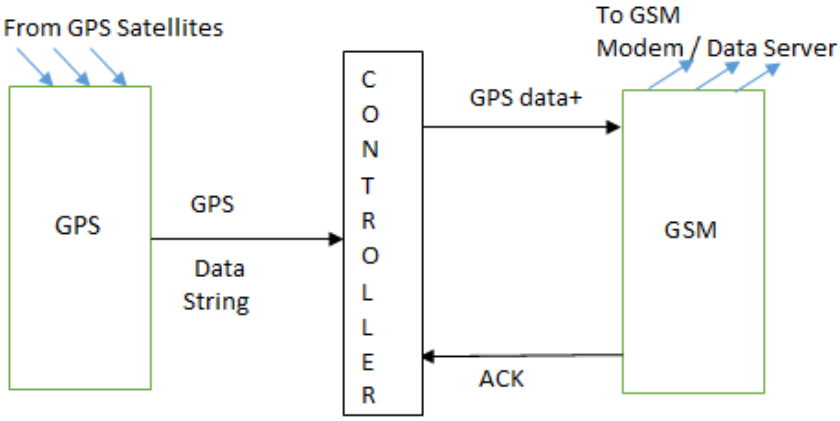

Fig. 4. Design Structure

This facts cord can be self-assured either by using IR sensor to control position. If information tributary is overconfidence by sensor, it is arrived by remote IR sensor and data is obsessed additional by visual basics and finally given to Laptop with Google Maps for present.

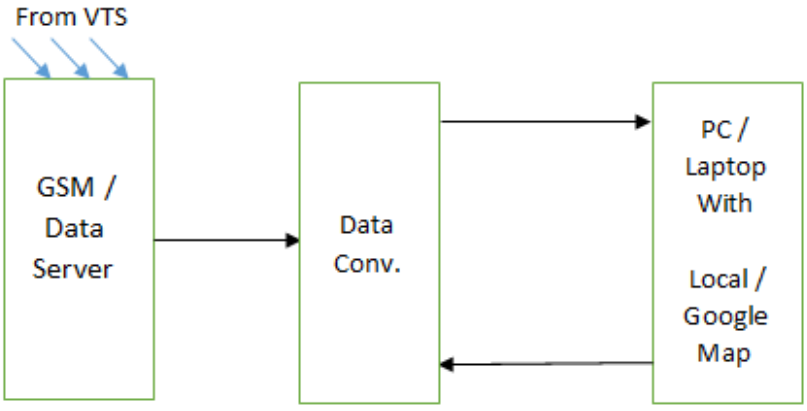

Fig. 5. Data Conversion System Model

In case of GPS, this data cord is encrypted and overconfident to selected inert IP tackle of Web server at direct position.

6. Result and Discussion

In this paper, propose a new tracking information system using both GSM and GPS have been discussed. The proposed tracking system based on cloud computing infrastructure The sensors are used to monitor the fuel level, driver conditions, and speed of the vehicle. All the data transferred to cloud server using GSM enabled device. All the vehicles equipped with GPS antenna to locate the place. To avoid the drunk and drive, the alcohol sensor are installed to monitor the driver status. The proposed technology significantly avoids the accident in highways.

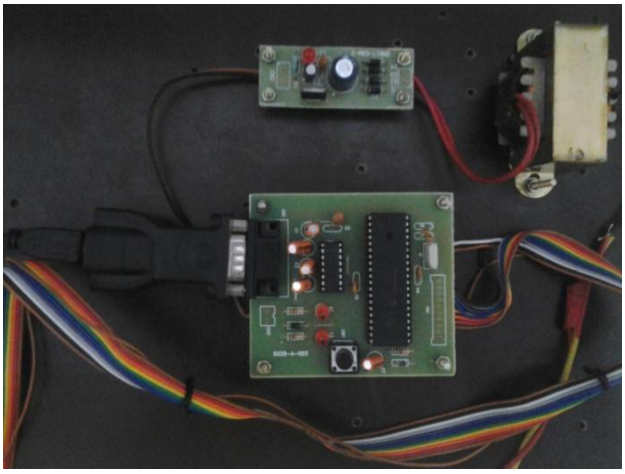

Fig. 6. Circuit Design

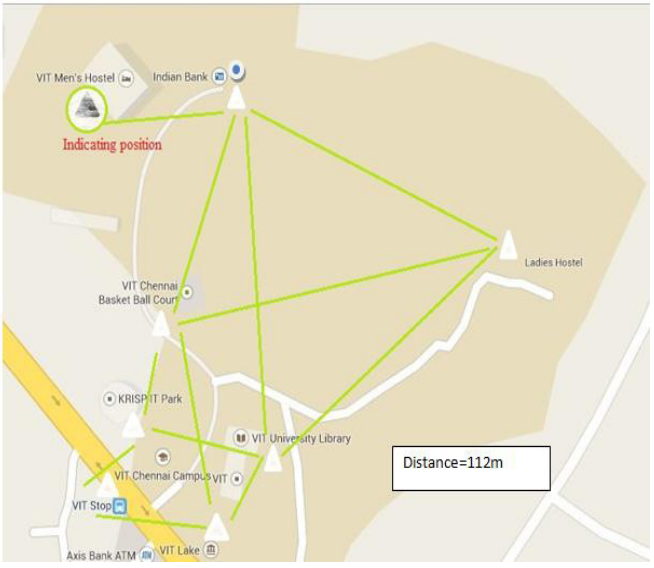

Fig. 7. Map Identification

7. Conclusion

A prototype model for Intelligent Vehicle Monitoring using Global Positioning System and Cloud Computing has been developed. The proposed tracking system is based on cloud computing infrastructure along with sensors useful for monitoring the fuel level, altitude, tire pressure, driver conditions, and speed of the vehicle. All the data is

transferred to cloud server using GSM enabled device. All the vehicles are equipped with GPS antenna for pinpointing the location. To avoid the drunken driving, the alcohol sensors are installed to monitor the driver status. The proposed technology significantly avoids the accident in highways.

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